

REMARKS

Claims 1-21 are pending in the present application. Claims 14-21 are withdrawn from consideration.

In the Office Action, Claim 10 was rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 was rejected under 35 U.S.C. 103(a) as being unpatentable over Kerner et al. (U.S. Patent No. 4,212,855) in view of Masseling et al. (U.S. Patent No. 5,194,239). Claims 2-10 and 12-13 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kerner et al. in view of Masseling et al. as applied to claim 1 above, and further in view of Winkler et al. (U.S. Patent No. 6,500,402). Claim 11 was rejected under 35 U.S.C. 103(a) as being unpatentable over Kerner et al. in view of Masseling et al. and Winkler et al. as applied to claim 9 above, and further in view of Senjo et al. (U.S. Patent No. 4,061,743).

Claims 1 and 10 have now been amended. New claims 22-25 have been added. No new matter has been added. Reconsideration of the application in view of the above amendments and following remarks is respectfully requested.

Rejection of Claim 10 under 35 U.S.C. § 112

Claim 10 was rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner stated that in claim 10 no antecedent basis existed for the recited limitation "the pre-absorber".

Claim 10 of the present application has now been amended so as to recite "a pre-absorber" and therefore provides proper antecedent basis.

Reconsideration and withdrawal of the rejection to claim 10 under 35 U.S.C. § 112, second paragraph, is respectfully requested.

Rejections under 35 U.S.C. § 103(a)

Claims 1 was rejected under 35 U.S.C. § 102(a) as being unpatentable over Kerner et al. (US 4,212,855) in view of Masseling et al. (US 5,194,239). Claims 2-10 and 12-13 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kerner et al. in view of Masseling et al. as applied to claim 1 above, and further in view of Winkler et al. (U.S. Patent No. 6,500,402). Claim 11 was rejected under 35 U.S.C. 103(a) as being unpatentable over Kerner et al. in view of Masseling et al. and Winkler et al. as applied to claim 9 above, and further in view of Senjo et al. (U.S. Patent No. 4,061,743).

Kerner describes a process for the production of concentrated sulphuric acid. An H₂S-containing gas 3 is fed together with air 4 into a combustion furnace 2 where the H₂S-containing gas is burned to form a moist SO₂-containing gas. Part of the moist SO₂-containing gas flows into a cooling tower 6 where it is cooled and recycled back via line 11 to combustion furnace 2. See Kerner, column 1, lines 6-9, column 4, lines 29-32 and Fig. 1.

Masseling describes an oxygen-based noncatalytic process to produce sulphuric acid. Molten sulphur in line 10 is fed together with oxygen in line 12 into a sulphur combustion zone 16 where the sulphur is combusted to yield SO₂, SO₃ and inerts. The SO₂, SO₃ and inerts are then passed into sulphur trioxide absorption zone 20 where essentially all the SO₃ is removed as sulfuric acid. The effluent gas stream from sulphur trioxide absorption zone 20 consisting mainly of SO₂, CO₂, O₂ and inerts is in part purged from the system via line 22 and in part recycled back to the sulphur combustion zone 16. See Masseling, the title, column 4, lines 39-68 and Fig. 1.

Winkler describes a high temperature catalyst for reacting SO₂ with oxygen to form SO₃. The catalyst, which is suited for a continuous operation at temperatures of 700 °C and above, comprises a porous carrier and an active component connected with the carrier, where the active component consists of 10 to 80 wt.-% iron, the carrier has a BET surface of 100 to 2000 m²/g and an SiO₂ content of at least 90 wt.-%, and the weight ratio of the carrier:active component lies in the range from 1:1 to 100:1. See Winkler, the abstract, column 1, lines 47-52 and column 3, lines 23-38.

Senjo describes a wet type exhaust gas scrubbing process for removing nitrogen oxides (NO_x) containing nitrogen monoxide and nitrogen dioxide from exhaust gases by oxidizing nitrogen monoxide into nitrogen dioxide and/or dinitrogen trioxide first and then by scrubbing the exhaust gases with an aqueous scrubbing suspension containing the sulfite of alkaline earth metal in a scrubbing column. See Senjo, column 1, lines 4-18.

Independent claim 1 of the present application has now been amended so as to recite a process for the production of sulphuric acid, including:

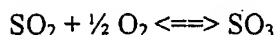
“withdrawing a partial stream of the sulphur dioxide and sulphur trioxide-containing gas from a contact stage located upstream of the last main contact stage,
mixing said partial stream with the feed gas to form a contact gas having a sulphur dioxide content of more than 13 % by volume, and
returning said mixed partial stream to the first contact stage, wherein the contact stages contain a catalyst.”

Support for this amendment may be found in the Specification, for example, on page 8, lines 16-20.

It is respectfully submitted that neither Kerner nor Masseling teach or suggest returning, to a first contact stage, a partial stream of SO_2 and SO_3 withdrawn from a contact stage and mixed with feed gas as recited in amended claim 1. In contrast, in one variation Kerner merely recycles via line 11 cooled SO_2 -containing gas back to combustion furnace 2. See Kerner, column 4, lines 29-32 and Fig. 1. In another variation, Kerner merely feeds SO_2 circulated from an intermediate absorption tower 114 via line 22 to a last contact stage 112. See Kerner, column 4, line 63 to column 5, line 9 and Fig. 2. Kerner does not mix any partial stream of SO_2 and SO_3 with feed gas. Masseling does not cure this defect. In contrast, Masseling merely recycles via line 24 an effluent gas stream containing mainly SO_2 back to sulfur burner 16. See Masseling, column 4, lines 64-68. Masseling thus does not return any partial stream of SO_2 and SO_3 to any contact stage at all. Indeed, Masseling has no contact stages or specifically catalyst-containing stages, as required by claim 1, as Masseling describes a completely different non-catalytic process.

As described in the present Specification, overheating of the catalyst in the first contact stage will be reliably avoided despite the application of a contact gas containing more than 13 % by

volume of sulfur dioxide, because the sulfur trioxide introduced via the re-circulated partial stream shifts the thermodynamic equilibrium of the oxidation reaction



towards the educts, enabling a lower conversion and resulting in a lower gas temperature at the exit of the contact stage. See Specification, page 3, line 26 to page 4, line 5. Kerner and Masseling do not address the catalyst overheating problem, and indeed describe processes completely different from the recited sulfuric acid production method. Nor does either of Winker or Senjo teach or suggest the features of claim 1 missing from Kerner and Masseling.

Because each of Kerner, Masseling, Winkler and Senjo fail to teach or suggest the above-recited features of amended claim 1, any combination of these references, to the extent proper, could not render claim 1 or any of its dependent claims obvious.

For the above reasons, reconsideration and withdrawal of the respective rejections of claims 1-13 under 35 U.S.C. § 103(a) based on a respective combination of Kerner, Masseling and Winkler is respectfully requested.

New Claims 22-25

New claims 22-25 have been added. Support for new claims 22-25 can be found in the Specification, for example, on page 3, lines 12-17, page 5, lines 10-15, page 8, lines 16-20 and Figs. 2-7.

It is respectfully submitted that new claims 22-25 are patentable over the cited references for at least the same reasons as independent claim 1 is.

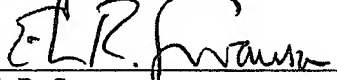
CONCLUSION

In view of the above amendments, Applicants believe the pending application is in condition for allowance.

The Commissioner is hereby authorized to charge any unpaid fees deemed required in connection with this submission, including any additional filing or application processing fees required under 37 C.F.R. §1.16 or 1.17, or to credit any overpayment, to Deposit Account No. 04-0100.

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Respectfully submitted,

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